REMARKS

Claims 1-18 are pending herein. By this Amendment, paragraph [0024] of the specification is amended to correct a typographical error and paragraph [0029] of the specification is amended to correct a typographical error and to add written descriptive support for claims 5, 13 and 16 into the specification. Claims 1 and 8 are amended to more clearly define the relationship among the components of the light emitting diode bar system in order to address the rejection under 35 U.S.C. §112, second paragraph, and to recite the result of reduction of electromagnetic interference emissions from the array of light emitting diodes in order to more fully define the invention over the teachings of Hardin as discussed below. Claim 1 is now directed to the particular embodiment of Fig. 2 of the specification, and the language of amended claim 1 is supported by original claim 1, Fig. 2, and paragraphs [0008], [0026] and [0031] of the specification. Amended claim 8 is now directed to the particular embodiment of Fig. 3 of the specification, and the language of amended claim 8 is supported in the original specification by original claim 8, Fig. 3, and paragraph [0033].

Claims 2 and 10 are also amended in order to conform with the amendments to claim 1. Claim 11 is amended to depend from claim 8. Claims 15 is amended to also define the result of the method, similar to the language added to claims 1 and 8.

Finally, claim 9 (dependent from claim 1) is amended, and new claim 18 (dependent from claim 8) is added, each directed to image forming device applications of the light emitting diode bar system. These claims are supported in the original specification at, for example, paragraph [0024].

No new matter is added by this Amendment. In view of the foregoing amendments and the following remarks, reconsideration of this Application is respectfully requested.

Applicant appreciates the courtesies shown to Applicant's representative by Examiner Pham in the October 2, 2003 interview. Applicant's separate record of the substance of the interview is incorporated into the following remarks.

I. August 13, 2003 Information Disclosure Statement

Applicant filed an additional Information Disclosure Statement on August 13, 2003. However, an initialed copy of the Form PTO-1449 from the Information Disclosure Statement was not returned to the undersigned with the Office Action. For the convenience of the Examiner, a further copy of the Form PTO-1449 from the August 13, 2003 Information Disclosure Statement is attached hereto. The Examiner is respectfully requested to initial the Form PTO-1449 and return the initialed copy to the undersigned with the next communication from the Patent Office.

II. Rejection Under 35 U.S.C. §112, First Paragraph

Claims 5, 13 and 16 were rejected under 35 U.S.C. §112, first paragraph as allegedly failing to comply with the written description requirement. In particular, it was alleged that the specification did not provide sufficient written description supporting the claim language of these claims.

By this Amendment, the specification, in particular specification paragraph [0029], has been amended to include verbatim support for the language of claims 5, 13 and 16. Accordingly, the specification now clearly provides written descriptive support for these claims. Reconsideration and withdrawal of this rejection are thus respectfully requested.

III. Rejection Under 35 U.S.C. §112, Second Paragraph

Claims 1-17 were rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite. This rejection is respectfully traversed.

Claim 1 was rejected as allegedly being incomplete for omitting essential structural cooperative relationships of elements. By this Amendment, claim 1 has been amended so as to more clearly recite the relationships and interactions between the array of light emitting diodes, the control unit and the spread spectrum clock generator in a first embodiment of the invention as shown in Figure 2. Further, for clarity, claim 8 has been amended to be in independent claim form and in order to also more clearly recite the relationships and interactions between the elements in a second embodiment of the present invention as shown in Figure 3. Neither amended claim 1 nor amended claim 8 omits essential structural cooperative relationships of elements. These amended claims thus comply with the requirements of 35 U.S.C. §112, second paragraph.

Claim 2 was rejected under 35 U.S.C. §112, second paragraph as it was allegedly not clear whether or not the spread spectrum output signal from the spread spectrum clock generator was the same as the clock output signal recited in claim 1. A similar rejection was made against claim 10. By this Amendment, claims 2 and 10 have been amended to clarify the relationship between the spread spectrum clock generator and the clock circuit of the control unit, and thus the alleged ambiguity in original claims 2 and 10 has been removed.

For at least the foregoing reasons, Applicant respectfully submits that claims 1-18 comply with the requirements of 35 U.S.C. §112, second paragraph. Reconsideration and withdrawal of this rejection are respectfully requested.

IV. Rejections Under 35 U.S.C. §103(a)

A. Claims 1-17

Claims 1-17 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,631,920 (Hardin) in view of U.S. Patent No. 5,668,937 (Shimizu). This rejection is respectfully traversed.

Hardin describes a clock circuit that includes an oscillator for generating a reference frequency signal and a spread spectrum clock generator cooperating with the oscillator and generating a spread spectrum clock output signal having a fundamental frequency and reduced amplitude EMI spectral components at harmonics of the fundamental frequency. See the Abstract. As explained in the Background section of Hardin, conventional clock pulse generating means have a tendency to generate and radiate electromagnetic interference (EMI). See also col. 2, lines 39-46 and 49-59, explaining the spread spectrum clock generating means includes a spread spectrum modulating means that broadens and flattens amplitudes of EMI spectral components that otherwise would be produced by the clock pulse generating means.

As evident from the foregoing, Hardin is concerned with the electromagnetic interference generated by the use of clock circuits per se. Such is in contrast to the present invention wherein although the generation of electromagnetic interference from clock circuits is of some concern, the more significant concern is with respect to electromagnetic interference generated as a result of the use of arrays of light emitting diodes in an image formation process. See, for example, paragraphs [0031] to [0033] of the present specification. The present inventor surprisingly found that a spread spectrum clock generator could be used with a control unit (claim 1, Fig. 2) or with an array of light emitting diodes (claim 8, Fig. 3) in a light emitting diode bar system in order to acceptably reduce the electromagnetic interference emissions from the light emitting diode array.

Hardin at best thus teaches use of a spread spectrum clock generator to control the electromagnetic interference from a clock circuit per se, and does not teach or suggest control of electromagnetic interference emissions from a light emitting diode array in a light emitting diode bar system as in the present invention.

Hardin does teach that the clock circuit described therein may be utilized to control timing in a laser printer employing a laser beam. At col. 8, lines 29-37, it is described that a laser beam is swept across a photoconductor as it is pulsed or not pulsed at the clock times supplied by the clock circuit. However, such merely teaches that the clock circuit including a spread spectrum clock generator as described in Hardin may be used in synchronizing sweeps of a laser beam in a laser printer. Such does not teach or suggest either (1) that a spread spectrum clock generator can be used in association with an array of light emitting diodes in order to reduce the electromagnetic interference emissions from such array, or (2) how to implement a spread spectrum clock generator in a light emitting diode bar system for forming an image in order to affect the reduction of electromagnetic interference emissions from the array of light emitting diodes of the light emitting diode bar system.

That is, with particular respect to the claim language of claim 1, Hardin does not teach or suggest a light emitting diode bar system that includes a control unit having a clock circuit that outputs a clock output signal that enables properly timed activation of individual light emitting diodes of an array of light emitting diodes, which control unit further includes or is coupled to a spread spectrum clock generator that generates the clock output signal so that the clock output signal has reduced amplitude electromagnetic interference spectral components such that electromagnetic interference emissions from the array of light emitting diodes are reduced. With respect to claim 8, Hardin similarly fails to teach or suggest a light emitting diode bar system that includes a spread spectrum clock generator that is coupled to an array of light emitting diodes and in which the spread spectrum clock generator generates a spread spectrum output signal and reduced amplitude electromagnetic interference spectral components such that electromagnetic interference emissions from the array of light emitting diodes are reduced.

As evident from the foregoing, Hardin does not teach or suggest the light emitting diode bar systems of claims 1 or 8, or the method of reducing electromagnetic interference emissions from a light emitting diode bar system of claim 15, that have the recited construction and achieve the recited results. Hardin does not teach the use of light emitting diodes at all, and thus would not have suggested the construction and interaction of components as recited in the present claims.

The Patent Office acknowledged that Hardin failed to teach or suggest the use of an array of light emitting diodes, but nevertheless concluded that one of ordinary skill in the art would have found such use obvious from the teachings of Shimizu. In particular, Shimizu was relied upon as allegedly suggesting that either a laser beam or an array of light emitting diodes may be used in the formation of an image from a printer. Applicant respectfully submits that Shimizu fails to remedy the deficiencies of Hardin discussed above.

Shimizu at best teaches only that light emitting diode arrays were known to be used in printers. However, Shimizu does not teach or suggest that the use of light emitting diodes, unlike the use of laser beams, have an increased problem with respect to electromagnetic interference emissions. Shimizu also fails to teach or suggest how to control electromagnetic interference emissions from light emitting diodes if used. Finally, like Hardin discussed above, Shimizu fails to teach or suggest how to implement the use of a spread spectrum clock generator in conjunction with a light emitting diode bar system that includes an array of light emitting diodes for forming an image.

The mere known use of light emitting diodes in printers as indicated in Shimizu would not have led one of ordinary skill in the art to the presently claimed invention in which, for the first time in the art, a practical and simple solution to the problem of electromagnetic

interference emissions from light emitting diodes of a light emitting diode bar system is achieved.

Finally, with respect to claims 9 and 18, it must further be emphasized that neither Hardin nor Shimizu teach or suggest use of a light emitting diode bar system as recited in claims 1 and 8 in an image forming device in which the array of light emitting diodes forms a latent image of an original image on a surface of an electrically charged photoreceptor, which latent image is subsequently developed with toner and then transferred to a transfer surface.

For all the foregoing reasons, Applicant respectfully submits that neither Hardin nor Shimizu would have led one of ordinary skill in the art to the presently claimed invention and the surprising reduction in electromagnetic interference emissions from an array of light emitting diodes as presently claimed. Reconsideration and withdrawal of this rejection are thus respectfully requested.

B. Claims 6, 14, and 17

Claims 6, 14 and 17 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Hardin in view of Shimizu, and further in view of U.S. Patent No. 6,240,123 (Zhang). This rejection is respectfully traversed.

The Patent Office turned to the teachings of Zhang as allegedly suggesting an asynchronous spread spectrum modulation technique for generating a spread spectrum clock signal, and concluded that one of ordinary skill in the art would have found use of such technique obvious in the device of Hardin.

Applicant respectfully submits that even if the teachings of Zhang were to have been combined with the teachings of Hardin and Shimizu as alleged in the Office Action, the presently claimed invention still would not have been achieved. Zhang remedies none of the deficiencies of Hardin and Shimizu discussed extensively above. That is, Zhang also fails to

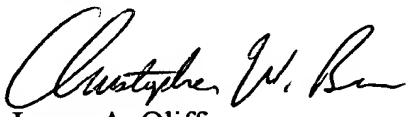
teach or suggest how to implement a spread spectrum clock generator within a light emitting diode bar system so that electromagnetic interference emissions from the light emitting diodes of the bar system are acceptably reduced.

For the foregoing reasons, Applicant respectfully submits that none of Hardin, Shimizu or Zhang teach or suggest the presently claimed invention. Reconsideration and withdrawal of this rejection are respectfully requested.

V. Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1-18 are in condition for allowance. Should the Examiner believe that anything further is necessary in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachment:
Form PTO-1449

Date: October 3, 2003

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